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PRODROMUS

OF THE

PALÆONTOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS

OF

VICTORIAN ORGANIC REMAINS.

DECADE IV.

BY

FREDERICK McCOY,

F.G.S.; HON. F.C.P.S.; C.M.Z.S.L.; HON. F.G.S.E.; HON. M.G.S.M., ETC.
AUTHOR OF "SYNOPSIS OF THE CARBONIFEROUS LIMESTONE FOSSILS OF IRELAND;" "SYNOPSIS OF THE SILURIAN FOSSILS OF IRELAND;" "CONTRIBUTIONS TO BRITISH PALÆONTOLOGY;" ONE OF THE AUTHORS OF "BRITISH PALÆOZOIC ROCKS AND FOSSILS," ETC.
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PREFACE.

As the publications of a Geological Survey cannot properly be limited to the maps and sections, but would be incomplete without figures and descriptions of the fossil organic remains made use of for the determination of the geological ages of the different geological formations of the country,* it has been determined to issue a "Prodromus" or preliminary publication of the Victorian Organic Remains in Decades, or numbers, of ten plates each, with corresponding letterpress, on the plan of the Decades of the Geological Survey of England, followed by the Geological Surveys of Canada, India, and several other Governments.

The Decades will contain figures and descriptions in the first place of the more characteristic fossils of each formation, of which good specimens may be in the National Collection ; so that observers in the field may make use of them for preliminary or approximate determination of the geological ages of the strata they may meet. A portion of the impression of the plates will be kept back until a complete systematic treatise on the fossils of each formation may be issued when the materials approach completion.

In this fourth Decade the first three plates illustrate new species of the gigantic elephantine marsupial forerunners of the little *Phascolarctos*, or "native bears" of our own time, species of *Dipro-*

* "Palæontological researches forming so essential a part of geological investigations, such as those now in progress by the Geological Survey of the United Kingdom, the accompanying plates and descriptions of British fossils have been prepared as part of the Geological Memoirs. They constitute a needful portion of the publications of the Geological Survey."—*Sir Henry T. De la Beche, Director-General of the Geological Survey of the United Kingdom, in notice prefixed to the first of the Decades of the English Geological Survey.*

todon and *Nototherium* not uncommon in the Pliocene Tertiary deposits of Victoria.

The fourth plate illustrates a peculiar variety of one of the most characteristic of the Miocene Tertiary species of *Pecten*.

The fifth plate is one of great interest to Victorian geologists, as affording illustrations of the most characteristic forms of fossil animals marking the Middle Devonian age, which I first determined from them as an unmistakable portion of the Palæozoic formations of Victoria. Those from the limestones of Buchan and Bindi show examples of a fossil coral identical with a species in the European limestones of the same age in the Eifel and Newton Bushel. With this is an European Middle Devonian *Spirifer* identical with specimens occurring in great abundance in the Eifel and other Continental localities, and which, although very rare in the Devonian strata of England, I found many years ago in the Valley of Rocks, Linton, N. Devon. The third species is a new *Chonetes* closely allied to a common one in the Rhine valley. A fourth form is a new *Phragmoceras* also closely allied to a common German Devonian one. And the fifth form is perhaps the most interesting of all, being the bony, stellately marked, plates of the great ganoid genus of Fish *Asterolepis*, so characteristic of the Old Red Sandstone or Devonian Rocks of Russia, where, however, it is not accompanied by the corals and shells of more southern Europe, while, on the other hand, the corals and shells of the same age in England and Germany are not accompanied by it, so that their occurrence together in the Victorian Devonian limestones of Gippsland is very curious.

The sixth plate illustrates some of the more abundant fossil plants of the Upper Devonian strata at Iguana Creek : one being of the peculiar type of *Cyclopteris*, named *Palæopteris* by Schimper and *Archæopteris* by Dawson, so abundant in the Upper Devonian strata of Ireland and Canada.

The seventh plate continues our illustrations of the extinct Oligocene Tertiary *Volutes*.

The eighth plate represents a fine species of *Spondylus* common in our Miocene Tertiary strata, closely representing the European Tertiary *S. gaderopus*, but quite unlike any shell living in our seas.

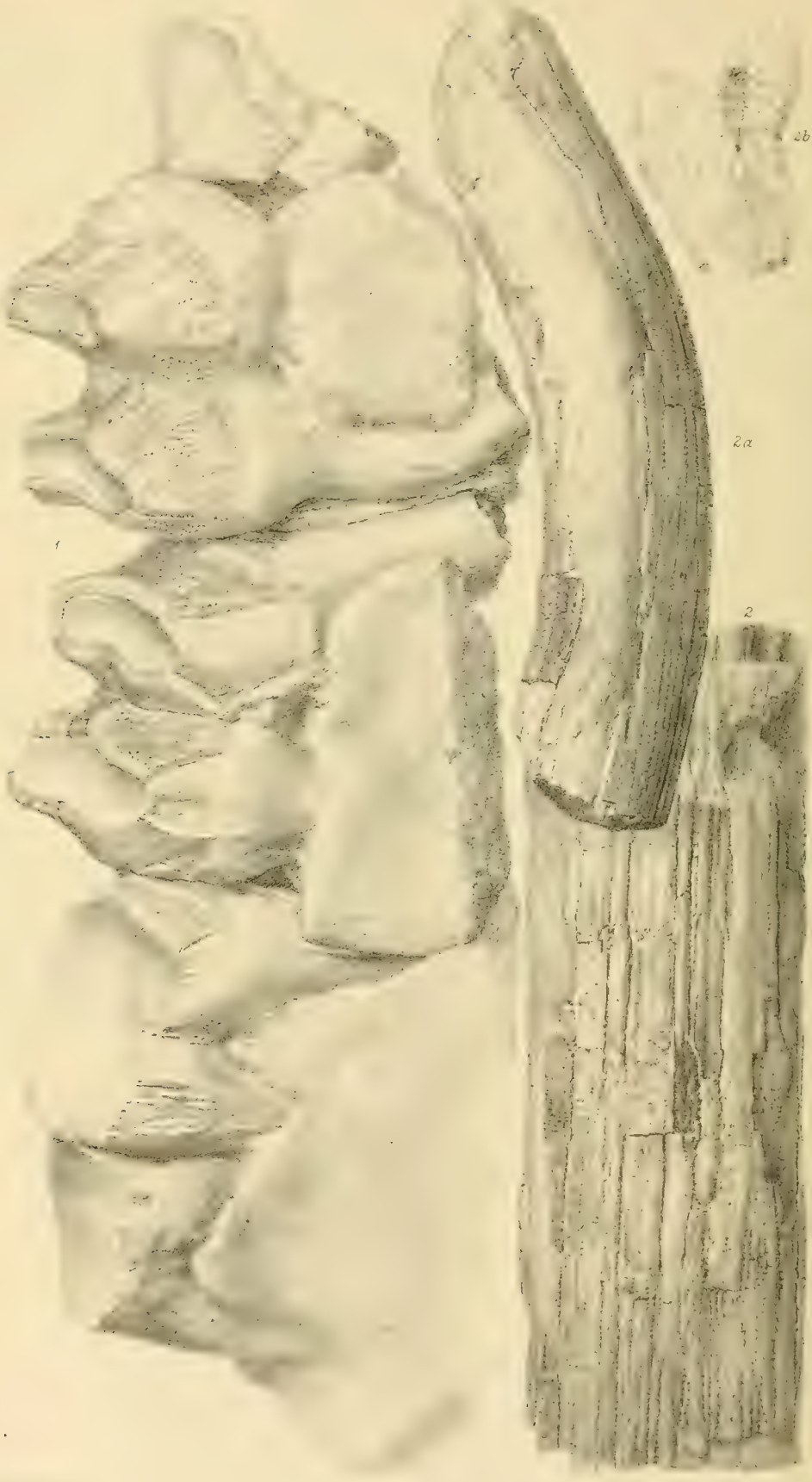
The ninth plate is of high interest, as exhibiting the form and size of the foliage of a species of *Eucalyptus* found abundantly in the strata of Pliocene Tertiary age in the gold mines of the Haddon Lead, proving that at this late geological period the forest vegetation was generically identical and specifically differing only in the smallest characters from the so-called gum trees now growing in the district.

The last plate is equally interesting, as showing that the trees and shrubs most common in our Miocene Tertiary strata were totally different in type from the prevalent vegetation of the country now, but agreed closely with the most characteristic Lauraceous Plants of the European Miocene Tertiary rocks.

The future Decades will continue the illustration of the fossil collections made in the course of the Geological Survey of the colony.

FREDERICK McCOY.

26th October 1876.


2b
2a
2
1

Plates XXXI., XXXII., and XXXIII.

DIPROTODON LONGICEPS (McCoy).

[Genus DIPROTODON (Ow.). (Sub-kingd. Vertebrata. Class Mammalia. Order Marsupiata).

Gen. Char.—Dental formula:—*i.*, $\frac{3-3}{1-1}$; *c.*, $\frac{0-0}{0-0}$; *d.m.*, $\frac{2-2}{2-2}$; *m.*, $\frac{3-3}{3-3}$. *Incisors*, 6 (3 on each side) in upper jaw; anterior pair broad, arched, scalpriform, and longitudinally sulcated; lateral pairs much smaller; 2 in lower jaw nearly straight, sub-cylindrical, obliquely worn at tip. *Molars*, each with two transverse prominent ridges, and usually a small basal ridge in front, and one behind; *fangs* large, branched. Anterior grinder (*d.* 3) shed at an early age. *Surface enamel* of all the teeth minutely rugose, with flexuous vermicular ridges, and intervening irregular pores.]

Description.—*Lower incisors:* Perfectly straight, with no trace of the upward curvature of *D. Australis* (Ow.*); length, 13½ inches (*D. Australis* only 10 inches); circumference at emergence from socket (5 inches from tip), 5 inches 3 lines: longitudinal extent of worn surface, 3 inches; greatest width, 1 inch 1 line, being as long as, but narrower and more oblique than, the same part of *D. Australis;* the wearing is in three planes corresponding to the three upper incisors opposed to it on each side: transverse section at point of emergence from socket oblong, with obtusely rounded angles; vertical diameter, 1 inch 11 lines; transverse diameter, 1 inch 5 lines; outer side slightly concave longitudinally above the middle, other sides slightly convex; less than two-thirds of the incisor is in socket, which extends backwards to vertical with line separating first molar from last premolar; surface of enamel with minute irregularly contorted vermicular longitudinal wrinkles and intervening irregular small pits and pores.—*Diastema:* From anterior upper edge of incisor socket to second molar (*d.* 4), 6 inches, and is consequently much longer than the corresponding part in *D. Australis*, which is only about 4½ inches, and it rises at a much smaller angle as it recedes from the incisor. *First molar* (*d.* 3) has been shed from age in our specimen, its place being indicated by a small protuberance in front of the next tooth seen in our plates XXXI. and XXXII., figs. 1 and 1*a*.—*Second molar* (*d.* 4): Antero-posterior diameter of base, 1 inch 2 lines, thus much smaller than similar old worn examples of *D. Australis*, which are 1 inch 8 lines (Ow. Op. Cit., t. 40, fig. 4), and in our species the great anterior and hind basal ridges, if they ever existed, are worn quite down; greatest transverse diameter (near hinder edge), 11 lines, while the corresponding part in a similarly aged tooth of *D. Australis* is 1 inch 2 lines. The smallest unworn corresponding tooth (said to be a young female from Victoria, Ow. Op. Cit., t. 40, fig. 2) is 1 inch 5 lines in fore-and-aft extent.—*Third molar* (*m.* 1): 1 inch 9 lines in fore-and-aft extent, and 1 inch 1½ lines in greatest transverse diameter; both the anterior and posterior basal ridges are smaller than in *D. Australis*, the anterior one being scarcely perceptible, and the posterior one forming a short prominent high part in the middle, deeply indenting the middle of the anterior margin of the next tooth behind, and then sinking rapidly to a lower level on the outer and inner sides.—*Fourth molar* (*m.* 2): Fore-and-aft length at base of crown, including the ridges, 2 inches 2 lines; greatest width, 1 inch 6 lines (corresponding measurements of homologous tooth in *D. Australis*, Ow. Op. Cit., t. 40, fig. 11, 2 inches 6 lines, and 1 inch 9 lines). Besides its smaller size and narrower proportion indicated by the

* Phil. Trans. 1870, t. 37, f. 4.

above measurements, this tooth in *D. longiceps* is distinguished from the correspondingly worn homologous one of *D. Australis* by the abruptly small rounded backward extension or lobe on the enamel on the hinder surface of the anterior lobe of the tooth, corresponding with the strong rounded longitudinal ridge projecting from the posterior face of the anterior lobe towards the opposite face of the posterior lobe, as in the ordinary Kangaroo type of tooth, of which there is comparatively no trace in the *D. Australis.* This tooth in the present species also differs in the anterior basal ridge, being deeply indented in the middle by the posterior ridge of the preceding tooth, and in the smaller development of the posterior basal ridge.—*Fifth or last molar* (*m.* 3) : Antero-posterior length, including basal ridges, 2 inches 4 lines; greatest transverse diameter, 1 inch 6 lines; anterior basal ridge almost obsolete; posterior basal ridge thick and strongly marked in the middle; antero-posterior longitudinal ridge extending backwards from middle of posterior side of anterior lobe nearly as in *m.* 2. *Surface* of all the molars longitudinally marked with coarse, vermicular, reticulo-punctate, irregularly curved, wrinkles.

As in South America the Geological period just before the creation of man, had the gigantic *Megatherium* to prefigure the little sloths of the present day, amongst the characteristic edentate group of mammals of the Fauna of the same country ; so the little native bears (*Phascolarctos*) of Victoria in our day, were preceded at the same late Tertiary period of Geological time by equally huge animals of their same general marsupial type, as characteristic of the existing Australian Fauna, as the edentate is of that of South America. The *Diprotodon* of Australia, curiously enough, like the *Megatherium* of South American deposits, was obviously a feeder on the twigs and foliage of trees, like their diminutive representatives of modern times ; but in each case it was necessary to have the same differences of conformation for the same reasons of the enormous difference in bulk between the old genera and the new. We have evidence in the ninth plate of this Decade that in the Pliocene Tertiary times the so-called "Gum trees" (*Eucalyptus*) were no larger in foliage or timber than now, and it is obvious that in one case, as in the other, it would be impossible for gigantic brutes, having a body as bulky as that of a hippopotamus or rhinoceros, to climb the trees, as the living American sloths or Victorian native bears do, to get their food ; in each case, as the extinct forms could not go up to the leaves, their powerful structure was so modified that they could tear down the forest trees to feed on their prostrate tops at leisure. No doubt this was done by both giants much in the same way—the *Megatherium* and *Diprotodon* rising on the hind legs, grasping the tree with the anterior limbs like a

wrestler, and by swaying from side to side bringing the tree down by the weight of the body applied by a power of grasping, given in each animal by the rotating articulation of the radius or smaller bone of the fore-arm allowing of pronation and supination as in a man or monkey. The *Diprotodon*, having powerful incisor teeth, could effect its object more easily by gnawing the timber so as to weaken it, and thus make up for its legs and pelvis being of the comparatively slender type of the Elephant rather than of the unexampled width and strength of these parts in the *Megatherium*. The anterior and posterior limbs of *Diprotodon* were not of very unequal size as in the Kangaroo, but more like ordinary quadrupeds as the Wombat, and the portions of the skeleton found indicate a length of about 10 feet and a height of about 6 feet. There are only two well-marked portions of the skeleton in our possession in the National Museum collection, one a huge *scapula*, or blade-bone, which, in this genus, is remarkable for its very narrow triangular shape as in birds and reptiles, and for the base of the triangle being below at the articular end instead of above; it is traversed by a very prominent keel or spine. The other is the distal end of a huge *humerus*, or arm bone, 10 inches wide, presented by the late Dr. Greeves, from near Lake Timboon. This bone, in *Diprotodon*, has little medullary cavity, and the inner condyle is not perforated as in Kangaroo and Wombat, agreeing in this respect rather with some of the arboreal forms of living marsupials (*Phalangista*, &c.).

This species nearly equalled in size the ponderous elephantine marsupial, the *Diprotodon Australis* of New South Wales and Queensland, but had obviously a much more slender or comparatively elongate head. This is shown by the longer and straighter lower incisors with their consequent longer and narrower worn surface, the longer and less inclined diastema in front of the molars, and the smaller and narrower molars; the proportionate differences of which are given above in detail. From tip of tusk to hind edge of last molar is $17\frac{1}{2}$ inches in our species, and about 20 inches 6 lines in *D. Australis*.

In this species there is a much nearer approach to the Kangaroo type of dentition, in the greater development of the fore-and-aft ridge from the middle of the posterior part of the anterior lobe

of the molars (*m.* 2, *d.* 3) (not marked in *D. Australis*), and in the much smaller development of the basal ridges.

The middle incisor of the upper jaw (*i.* 1) figured on our Plate XXXIII., fig. 2, from the Pliocene clays of Back Creek, may belong to this species ; but of this I cannot be certain. It differs from the corresponding tooth of *D. Australis* in being flatter : the sub-trigonal section, taking the longest transverse diameter as 100, gives a proportion thereto for the greatest diameter of the thicker side amounting to about $\frac{60}{100}$ in the present tooth, and upwards of $\frac{70}{100}$ in the corresponding part of *D. Australis*.

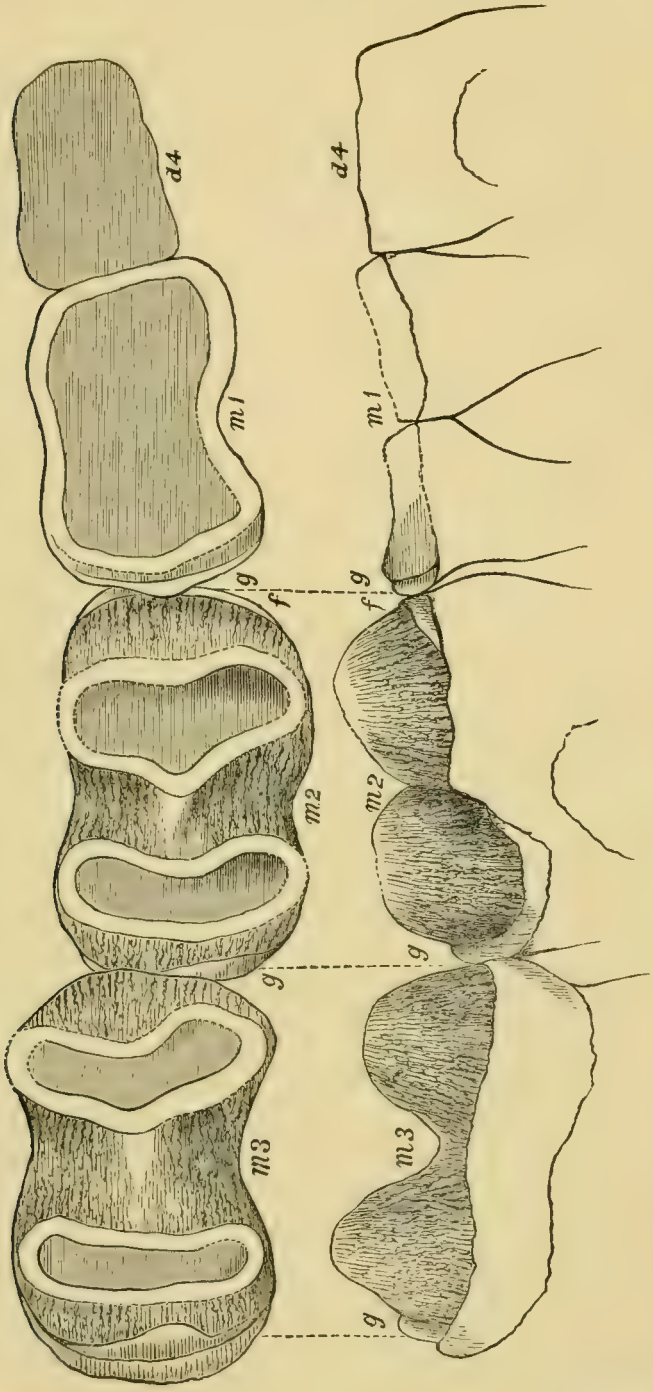
The fine specimen of the lower jaws figured was obtained in sinking a well in the Pliocene clays of Colac. It has the molar series of each side of the lower jaw perfect and in place, with the two great tusks also perfect and in their sockets. The individual was an aged one, as shown by all the molar teeth being worn by attrition against those of the upper jaw, and by the first molar (*d.* 3) not only having been long shed, but its sockets so completely filled up with bone as scarcely to leave a trace of their existence.

A very important specimen included in the hard fresh-water Pliocene Tertiary limestone of Limeburner's Point, near Geelong (45 miles S.W. of Melbourne), presented to the Museum by Mr. Mercer and Dr. Day of Geelong, shows the two rows of molars of the upper jaw in place, but the crowns are all broken off ; the bony palate is only 3 inches 7 lines wide opposite the interval between the last and penultimate molars ; or 1 inch less than the corresponding part of the *D. Australis*. Being broken behind this line I cannot say where the post-palatal vacuities may have reached to.

EXPLANATION OF FIGURES.

Plates XXXI. and XXXII.—Fig. 1, one ramus of lower jaw, viewed from the upper and inner side, with the three molars and last deciduous molar *in situ*, and with a small projection in front of the latter, possibly indicating the socket of a preceding tooth. The anterior portion of this specimen (which is only half the original) shows the undivided anterior portion of the mandible with the exposed portions of the two great incisor tusks characteristic of the genus. Half the natural size. Fig. 1*a*, external view of same specimen, half the natural size. Fig. 1*b*, crown of last molar, natural size, showing the reticulo-punctate enamelled surface. Fig. 1*c*, one of the incisor tusks, natural size. Fig. 1*d*, section of ditto at point of emergence from the socket. Fig. 2, lower tusk of *Nototherium* from Back Creek, inner side, natural size. Fig. 2*a*, ditto outer side, showing the rugged enamel. Fig. 2*b*, portion of surface, magnified to show the wrinkled and punctate character of the surface enamel, magnified.

Plate XXXIII.—Fig. 1, three molars and last deciduous molar of same specimen of *D. longiceps*, natural size.—(All the above from Colac.) Fig. 2, front view, natural size, of portion of anterior incisor of upper jaw of a *Diprotodon* from Back Creek, imperfect at each end. Fig. 2*a*, side view of ditto, natural size. Fig. 2*b*, transverse section of ditto, natural size.



Figures of molars of *Diprotodon longiceps* (McCoy), natural size, viewed exactly from above, and in profile, for greater convenience of more exact comparison with the figures of *D. Australis* (Ow.), in Prof. Owen's Memoir, than the oblique views in the lithographic plates would permit; *f*, anterior basal ridge; *g*, posterior basal ridge.

FREDERICK McCOY.


1
1 d
1 c
1 a
1 b

Plate XXXIV.

PECTEN YAHLENSIS (Wood). Var. SEMI-LÆVIS (McCoy).

[Genus PECTEN (Brug.). (Sub-kingd. Mollusca. Class Lamellibranchiata. Order Pleuroconcha. Fam. Pectinidæ.)

Gen. Char.—Shell depressed, upper valve most convex; slightly inequilateral; beaks contiguous; hinge line produced into ears on each side of the beak, the anterior largest and separated from the body of the shell in the lower valve by a deep notch for the passage of the byssus; ligament external, forming a narrow line along the hinge margin; cartilage internal in a triangular pit beneath the beaks; with, or without, radiating hinge-teeth.]

Description.—Sub-orbicular, apical angle 145°, ears nearly equal sub-quadrate, sharply defined, anterior ear of right valve notched for passage of byssus of attachment. *Right valve* deeper than the left one, moderately and evenly convex, most so near the middle; beaks depressed; surface smooth, with irregular lines of growth, strongest on the posterior ear, above the dorsal margin of which they rise as projecting angular scales. *Left valve* nearly flat, slightly convex in the middle, and slightly concave towards the sides; ears with the posterior one a little longer than the anterior one, but both slightly obtuse-angled; surface radiated with very numerous, sub-equal (or very rarely alternate) nearly straight, narrow, rounded ridges, about one-third of their thickness apart, with an occasional slight irregular flexuosity, crossed by sharp, erect, concentric, scaly laminæ of growth, slightly farther apart than the thickness of the ridges (about 8 or 9 ridges in middle of shell in space of 3 lines at 2 inches from beak, about 5 in same space at 4 inches from beak); 6 to 9 narrow radiating ridges on each ear, with transverse scales rather closer than those of body. *Length* of large specimen, 4 inches 1 line (more commonly about 2 inches); proportional width from beak to opposite margin, $\frac{9}{10}\frac{2}{0}$; length of anterior ear, $\frac{2}{10}\frac{0}{0}$; of posterior ear, $\frac{2}{10}\frac{2}{0}$; greatest depth (about middle) of right valve, $\frac{2}{10}\frac{2}{0}$; of left valve, $\frac{3}{10}\frac{}{0}$. Substance of valves thin.

Reference.—Rev. J. E. Woods, Ad. Phil. Soc. 1865, t. 1, fig. 4.

The typical variety differs form the above in having the right or deeper valve radiated with from 59 to 67 strong, straight, moderately convex, rounded, sub-equal ridges, separated by shallow concavities, rather less than the width of the ridges (4 or 5 in 3 lines at 2 inches from beak, 2 in same space at 4 inches from beak), and crossed by lines of growth which are only conspicuous or interrupt the smoothness of the radiation at wide irregular intervals, or near the lateral edges of old specimens. In some specimens of this variety, too, the ears are indistinctly radiated, and one gigantic specimen, presented by Mr. Howitt from Bairnsdale, has a length of nearly 5 inches, and the valves almost equally convex.

Although color varies much in different individuals of many species of *Pecten*, it is extremely unusual in this genus for the

sculpturing to vary, and this species is the most extraordinarily variable in the sculpturing of the right valve that I know. The left valve presents little variety in this respect, but in the variety *semi-lævis* which I have now figured, the right valve is quite smooth, while the left valve, attached still to it, is of the ordinary typical character; generally this valve is completely and strongly radiated with sub-equal, round, nearly smooth ridges, as in the original type of the species, while a specimen from Mordialloc has all the rostral portion smooth, and the marginal portion radiatingly ridged, thus uniting the two extreme varieties.

In size, shape, form of ears, relative convexity of the two valves, and the numerous narrow scaly ridges of the flatter one, this fossil resembles the well-known German Miocene Tertiary species, the *Pecten Hofmanni* of Goldfuss from Bünde in Westphalia, so nearly, that at first sight one might mistake one for the other; the ridges, however, are slightly larger, usually more nearly equal, and less rigid in this species, which is totally distinguished by having the right or deeper valve different from the other, while they are both alike in the *P. Hofmanni.* The convexity of the left valve is sometimes greater than in the specimen figured and described.

Small and rare in Lower Pliocene beds of Brighton Beach, near Mordialloc.

Extremely abundant in the Miocene Tertiary sandy beds on the shores of Corio Bay, A^d 15.

Common, A^d 22. Common with the two valves together of large size in Miocene sandy beds of Bairnsdale, Mitchell River. At (A^w 10); in the sandy beds of Middle Miocene Tertiary on coast 1 mile W. of Sherbrook River, 37 miles E. of Warrnambool; of large size at A^d 28 and A^d 12.

Very rare in Oligocene Tertiary clays near foot of Mount Eliza.

EXPLANATION OF FIGURES.

Plate XXXIV.—Fig. 1, right valve, of unradiated variety, natural size. (The figure has been reversed in the lithographing.) Fig. 1*a*, profile view of same specimen, natural size. Fig. 1*b*, left valve of same specimen, natural size. (Also reversed in the lithograph.) Fig. 1*c*, portion of surface of unradiated valve of this variety, magnified. Fig. 1*d*, portion of left valve, magnified.

FREDERICK McCOY.

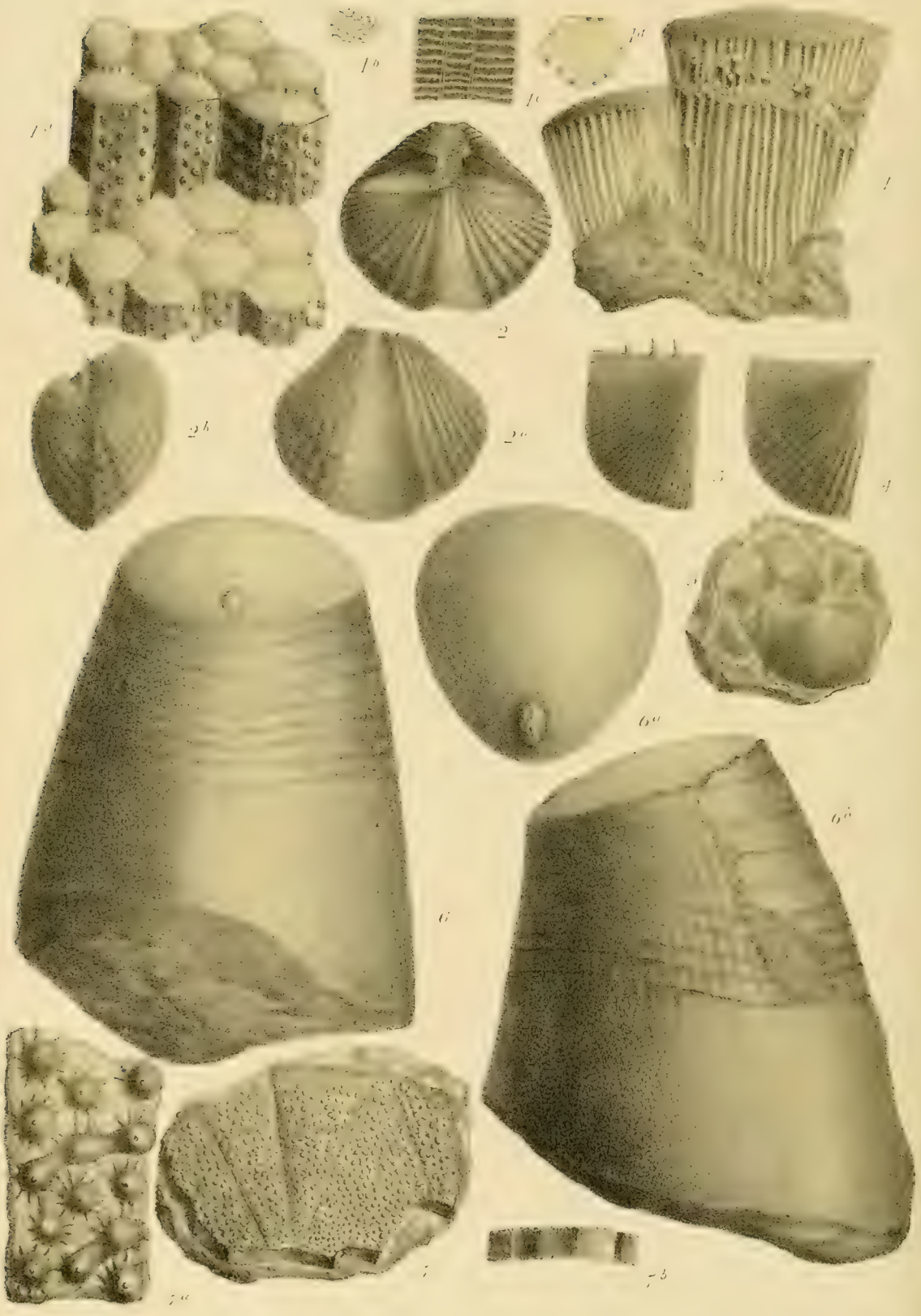


PLATE XXXV., FIGS. 1–1*d*.

FAVOSITES GOLDFUSSI (D'ORB.).

[Genus FAVOSITES (LAM.) restricted = CALAMPORA (GOLD.). (Sub.-kingd. Radiata. Class Zoophyta. Order Zoantharia. Tribe Madrephyllaca. Fam. Milleporidæ. Sub-fam. Favositinæ.)

Gen. Char.—Corallum composed of very numerous tubes, rounded or prismatic or polygonal (from mutual pressure), traversed by numerous horizontal diaphragms, destitute of vertical radiating lamellæ, or internal sulci ; sides or angles with distinct communicating pores ; young tubes formed by lateral budding or interpolation, mouths of the tubes opening at right angles to their length.

Distinguished from *Chætetes* by the lateral communicating pores ; by the young being added by interpolation and not by fission or splitting of the old tubes, and, as a consequence of this mode of development, the *exterior* walls being exposed by rough vertical fracture.]

DESCRIPTION.—Corallum forming convex pyriform or globular masses of radiating polygonal cell-tubes, nearly of one size, varying from 1 line in diameter to 4 in a space of 3 lines. Usually 2, but sometimes 1 or 3, rows of connecting pores with tumid edges, on each face of the prismatic tubes; these are scarcely their own diameter apart and often half their diameter apart, or 3 in a vertical row in a space equalling the width of the average faces of the tubes. Diaphragms slightly convex, often with 1 to 3 crenulations on the edge of each straight side, varying from 4 to 7 in a space equalling the diameter.

I formerly held the opinion with Goldfuss that the Upper Silurian and Devonian so-called *F. Gothlandica* were only varieties of one species, and I still think that the variations of different specimens from each formation render the proposed separation as a distinct species of the Devonian form by Prof. d'Orbigny doubtful ; there can be no doubt, however, that our Victorian coral from the Buchan agrees perfectly with the Devonian *F. Goldfussi* of beds of the Devonian age in Europe, distinguished from the Silurian allied form by the closer and more numerous connecting pores. The transverse diaphragms are also generally closer or more numerous in a space equal to a diameter, in this species, although, as above indicated, very variable, and occasionally agreeing with the Silurian form in this respect.

The outer walls of the tubes present often one to three obscure longitudinal ridges and some transverse wrinkles like the European examples. The crenulations on the edge of the sides of the dissepiments or tabulæ seem to be more connected with the number of

rows of pores on the corresponding faces of the tube than with true radiating lamellæ.

Abundant in the Middle Devonian limestone of Buchan.

EXPLANATION OF FIGURES.

Plate XXXV.—Fig. 1, portion of mass, natural size, showing exterior of prismatic columns as exposed in rough fracture. Fig. 1*a*, portion of ditto, magnified, showing the tumid edged communicating pores varying from one to two or three vertical rows on each face. Fig. 1*b*, portion of upper surface, natural size. Fig. 1*c*, vertical section, magnified, showing the variable distance of the transverse diaphragms or tabulæ. Fig. 1*d*, upper surface, magnified, of one of the transverse diaphragms or tabulæ, showing the one, two, or three indentations like incipient radiating lamellæ on each straight side.

PLATE XXXV., FIGS. 2–2*b*.

SPIRIFERA LÆVICOSTA (VAL.).

[Genus SPIRIFERA (Sow.). (Sub.-kingd. Mollusca. Class Palliobranchiata. Ord. Brachiopoda. Fam. Spiriferidæ.)

Gen. Char.—Transversely oval, gibbous, radiatingly-ridged; hinge-line as long as the shell is wide; area nearly parallel-sided, of moderate width in the receiving valve, very narrow in the opposite one; shell fibrous, foramen notching the area of both valves, that of the entering valve open, that of the receiving valve with an internal pseudo-deltidium bordered by two strong diverging dental lamellæ in the receiving valve; and by the flattened bases of the spiral apophyses in the other, which also usually shows a small mesial septum; casts of receiving valve are trilobed towards the beak, the small middle lobe being defined by the ends of the diverging dental lamellæ on each side, its rounded end (analogous to a pseudo-deltidium) as well as those of the lateral lobes being formed by an inner layer of shell, between which and the external one is a wide hollow space. The muscular impressions of the great valve are shallow, radiated just within the ends of the dental laminæ; those of the entering valve (in the Permian *S. alatus* and the Silurian *S. Lynx*) resemble those of Orthis, the four impressions being rounded and grouped together on the rostral half of the middle, their boundaries forming a more or less distinct crucial mark, depressed in casts.]

DESCRIPTION.—Rotundato-quadrate, very gibbous, slightly wider than long; hinge-line slightly shorter than the width of the shell, obtusely rounding the lateral cardinal angles; cardinal area concave, moderately wide; beaks small, moderately incurved; large valve with a wide deep concave mesial furrow distinctly defined to the beak, and 12 or 13 simple obtusely rounded or subangular ribs on each side; the mesial fold of the smaller valve is smaller than the sinus, only moderately convex, often with a slight mesial sulcus. Surface nearly smooth, with a few lines of growth near the edge, and under a strong lens slightly granulo-punctate perhaps by the ends of the fibres of the shell tissue. Usual width, 1 inch 4 lines; proportional length of large valve, $\frac{90}{100}$; of smaller valve, $\frac{75}{100}$; depth of both valves, $\frac{65}{100}$; width of cardinal area, 3 lines; width of mesial hollow at front, 6 lines.

REFERENCE.— = *Terebratula lævicostata*, Valenciennes in Lam. Hist. Nat. des Anim. sans Vertèbres, v. 4, p. 1, 259. = *Terebratulites ostiolatus*, Schlotheim Nachträg. zur Petrefactenkunde, t. 17, f. 3.

This well-known species, the *Spirifera ostiolata* of most European writers, is so rare in England that I have only seen it in the Valley of the Rocks, Linton, North Devon, but it abounds in the Middle Devonian limestones of the Eifel country, and with these the Victorian Gippsland specimens agree in every particular of size, shape, ribbing, and surface.

Abundant in the Middle Devonian limestones of Buchan and Bindi, North Gippsland.

Explanation of Figures.

Plate XXXV.—Fig. 2, average specimen, natural size (beak of the large valve broken), showing the cardinal area of larger valve and mesial ridge of the smaller valve. Fig. 2*a*, same specimen showing the larger valve with the wide mesial hollow. Fig. 2*b*, side view of same specimen.

Plate XXXV., Figs. 3–5.

CHONETES AUSTRALIS (McCoy).

[Genus CHONETES (Fischer). (Sub-kingd. Mollusca. Class Palliobranchiata. Ord. Brachiopoda. Fam. Productidæ.)

Gen. Char.—Shell approximately semicircular, large valve regularly convex externally, smaller valve nearly as concave externally as the other is convex; hinge-line straight as long as the shell is wide, with a narrow nearly parallel-sided cardinal area in each valve, that of the larger valve divided in the middle by a triangular opening nearly closed by a pseudo-deltidium above and by the trifid rostral tooth of the other valve below; two small cardinal teeth at the base of the aperture in the large valve; internal surface rough with minute pointed projections. A row of small tubular pointed spines on each side of the beak along the hinge-line of the larger valve, diverging obliquely upwards and outwards in the plane of the margins. Exclusively Palæozoic.]

Description.—Rotundato-subquadrate, hinge-line straight as long as the shell is wide, sides nearly rectangular, only slightly convex; front margin moderately convex; large valve moderately tumid in the middle, gradually flattened towards the lateral angles; about 4 or 5 short conical oblique tubular spines on each side of the beak; smaller valve not so concave as the other is convex; radiating ridges of large valve about 60 at the margin, rounded, slightly rugged, separated by rather narrow spaces, and 38 at 3 lines from beak, whereabouts most of them branch, but the ridges before branching are not much thicker than afterwards; ridges of small valve nearly simple. Width, about 9 lines; porportional length, $\frac{75}{100}$; depth, $\frac{25}{100}$.

In many respects this is closely allied to the *Chonetes sarcinulata* of Schlotheim so abundant in the Rhenish Devonian beds; but there is not the remarkable sudden diminution of the thickness of the

ridges after branching which so often gives the semiradiate character to the surface of that species, and they are much finer and more numerous, being in this species 13 in 3 lines at 3 lines from the beak, but only about 7 in same space at same part of *C. sarcinulata.*

Very abundant in the Middle Devonian limestone of Lucknow, E. of Mitchell River ; also of Buchan.

EXPLANATION OF FIGURES.

Plate XXXV.—Fig. 3, magnified view of half of larger valve, showing the branching ridges and the tubular spines on the hinge-line. Fig. 4, magnified, half of smaller valve, showing the more simple ridges. Fig. 5, portion of limestone, showing the largest specimen seen, natural size, with others of the more ordinary dimensions, showing the gregarious nature of the species.

PLATE XXXV., FIGS. 6-6*b*.

PHRAGMOCERAS SUBTRIGONUM (McCOY).

[Genus PHRAGMOCERAS (BROD.). (Sub-kingd. Mollusca. Class Cephalopoda. Order Tentaculifera. Fam. Nautilidæ.

Gen. Char.—Shell short, arched, compressed ; septa simple, crossed by sigmoidal lines of growth ; siphon at the inner edge, dilated between the septa.]

DESCRIPTION.—Gradually tapering, gently arched ; section subtrigonal ; periphery broadly convex ; sides flattened, converging to a narrow convex inner side ; siphon large (about 3½ lines long, and 3 lines wide at ninth septum from last), oval, about half its length from inner edge ; septa moderately convex with a slight forward wave at inner edge. Surface with sub-equal obtuse longitudinal ridges, separated by hollows about their own width, about 5 ridges in half an inch near last chamber. The last 9 septa occupy 1 inch on the inner side, and 1 inch 7 lines on the outer side, the outer distance apart being little greater than the inner for the latter chambers, but nearly double of it for the preceding chambers, where the general curvature is greater ; antero-posterior diameter at last chamber 2 inches 4 lines (1 inch 9 lines at 9 septa back) ; greatest transverse diameter near middle nearly the same as the antero-posterior.

The genus *Phragmoceras* is only found in Lower and Middle Palæozoic rocks, not continuing to the Carboniferous period, and the present species belongs to the less compressed group found in the Devonian formations. This species is easily distinguished by the near equality of the two diameters of the septa and the subtrigonal form of section resulting from the convergence of the flattened

sides to the narrow rounded inner side. It is most nearly allied to the *Phragmoceras subventricosum* of d'Archiac and de Vernéuil from the Devonian limestone of Gerolstein in the Eifel (in which I find traces of similar longitudinal ridging, although not referred to in their description), but that has a regular transverse oval section with the inner side as broadly convex as the outer one, and the siphon is smaller than in ours. The *Cyrtoceratites lineatus* (Gold.) of the Eifel, and the *C. plano-excavatum* (Sand.) from Cramberg Nasau, are nearer in form of section and ribbing, but have the siphon on the convex or outer side of the general curve.

In the Middle Devonian limestone of Buchan, Gippsland.

EXPLANATION OF FIGURES.

Plate XXXV.—Fig. 6, view from inner side, natural size, showing the wave there of the septa, and the position of the siphuncle on the septum at upper part. Fig. 6*a*, end view of septum of same imperfect specimen, showing form of the section and place of siphuncle. Fig. 6*b*, side view, showing arched tapering form, sigmoid bend of septa, and longitudinal sulcation.

PLATE XXXV., FIGS. 7–7*b*.

ASTEROLEPIS ORNATA (EICHWALD). VAR. AUSTRALIS (McCOY).

[Genus ASTEROLEPIS (EICHWALD). (Sub-kingd. Vertebrata. Class Pisces. Order Ganoida. Tribe Placodermata.)

Gen. Char.—Body with an exoskeleton of large thick flat bony plates, the external surface of which is covered with a layer of ganoine, sculptured into round smooth tubercles, radiated at base with numerous short narrow ridges; the tubercles sometimes running into one another to form short ridges. Exclusively Devonian.]

DESCRIPTION.—Plates of body covered with close stellated tuberculation; tubercles rounded, sub-equal, smooth, each with about 12 short radiating ridges nearly equally spaced round its base, irregularly placed, averaging less than their diameter apart, rarely arranged more closely in lines, and rarely anastomosing into short vermicular ridges. Average number of tubercles, 5 in 3 lines. Interstices between the tubercles granulo-punctate. Thickness of plates, about 2 lines.

REFERENCE.—(AG.), Poissons Fossiles des Vieux Grès Rouge, t. 28*a*, f. 25; t. 30, f. 2–9; t. 30*a*, f. 5–9.

All the figures in Agassiz' work have the tubercles too large and too far apart compared with the originals from the Russian Old Red

Sandstone, which, placed side by side with our Australian specimens from the Buchan limestone, agree in every particular so closely that I can only doubtfully indicate a local variety on the ground of the tubercles being slightly less prominent and more closely crowded in the Australian than in the Russian examples ; but even in these respects some portions of the Russian bony plates may be found agreeing completely, although the two are in general perhaps distinguishable in these respects.

The great ganoid armour-plated fishes of the genus *Asterolepis* are amongst the most abundant and striking characteristics of the Devonian rocks of Russia, and it is certainly a most extraordinary circumstance to find them here in Australia in limestones of the same age, and accompanied by the corals and shells of the Plymouth and Eifel limestones of similar age, with which they are not known to occur in England or Germany, and which do not occur with them in the Russian beds. Some impressions of this species in the Buchan strata might readily be taken for the genus *Bothriolepis*, from the tubercles seeming to be represented by pits, but on taking impressions of them in wax and gutta-percha, the identity with the *Asterolepis* is evident.

Rare in the Middle Devonian limestone of the Buchan River, North Gippsland.

Explanation of Figures.

Plate XXXV.—Fig. 7, portion of bony plate, natural size. Fig 7*a*, portion of surface of ditto, magnified to show the stellar character of the base of the tubercles, with a few of them uniting into short ridges. Fig. 7*b*, edge view, natural size, showing the thickness of the bony plate.

Frederick McCoy.

(Devonian Plants)

PLATE XXXVI., FIGS. 1–2*a*.

ARCHÆOPTERIS HOWITTI (McCOY).

[Genus ARCHÆOPTERIS (DAWSON). = PALÆOPTERIS (SCHIMPER, not GEINITZ). (Class Acotyledones; sub-class Acrogenæ. Order Filices. Fam. Neuropteridæ.)

Gen. Char.—Bipinnate; pinnæ alternate, pinnules obliquely obovate, imbricate, opposite with narrow decurrent base; a pinnule often on the rachis between bases of pinnæ; neuration fine divaricating, dichotomous; fertile pinnules in the midst of the infertile ones; sori ovate, in bunches at ends of much divided veins.

Common in Upper Devonian beds of Europe and North America, and rare in the lower Carboniferous.]

DESCRIPTION.—Pinnæ upwards of 4 inches long, and about 1½ inches wide. Pinnules sub-opposite, imbricate, obliquely ovato-rhomboidal, narrowed to the base, which articulates to the petiole so as to appear slightly decurrent on one face, and obliquely inserted on the other; terminal pinnules nearly the size and shape of the lateral ones, but equilateral; average length of each pinnule, 1 inch 1 line; width, 6 lines. Nerves slightly radiating, slender (about 14 in 3 lines across the middle), with 2 or 3 dichotomous branches from base to upper margin; edges only slightly lacerated.

This sub-genus of *Cyclopteris* is a portion of the *Palæopteris* of Schimper, but, as Dr. Dawson points out, that name was previously used by Geinitz for a different set of plants, and the present generic name is adopted as proposed by Dr. Dawson for that section, agreeing with the Upper Devonian *P. Hibernica* of Irish, and *P. Jacksoni* of Canadian, Upper Devonian strata.

This species is most allied to the Canadian *A. Jacksoni* from the Upper Devonian beds of Gaspé, from which it differs in its larger and broader pinnules, and to the *A. Hibernica* from the Upper Devonian of Kilkenny and Berwickshire, from which its shorter, broader, and more closely set imbrication pinnules and smaller pinnæ distinguish it. The fertile pinnules have not been found as yet.

Abundant in the Upper Devonian olive flags of Iguana Creek.

EXPLANATION OF FIGURES.

Plate XXXVI.—Fig. 1, longest pinna with terminal pinnule found, natural size. Fig. 2, well-preserved pinnules, showing the form and dense placing on the rachis. Fig 2*a*, one of the pinnules magnified to show the neuration and form of the attachment at base.

PLATE XXXVI., FIGS. 3–5*a*.

SPHENOPTERIS (EREMOPTERIS) IGUANENSIS (McCOY).

[Genus SPHENOPTERIS (BRONG.). (Class Acotyledones; sub-class Acrogenæ. Order Filices. Fam. Sphenopteridæ.)

Gen. Char.—Frond bi- or tri-pinnatifid or pinnate; leaflets lobed, narrowed at the base; lower lobes largest, diverging; veins subradiating, subflexuous, pinnate, dichotomous, seeming to radiate from the base; midrib inconspicuous, undulating.

Sub-genus Eremopteris (Schimper). Frond dichotomously pinnate; pinnæ irregularly pinnatifid, laciniate; lobes elongate, obovate or subcuneate; veins dichotomously radiating from base.]

DESCRIPTION.—Dichotomously bi-pinnatifid; segments of usually 5 to 7 lobes, oblique elongate cuneate, confluent at base, the apices crenulato-lobate by small acutely angular indentations; veins slender, numerous, forked, diverging from the base, usually about 3 to each lobe, a few towards the middle stronger than the rest, but no distinct midrib. Rachis rather thick. Length of pinnules, 1 to 2 inches; greatest width, usually about 4 lines.

The pinnules or lobes are smaller, narrower, diverge at a more acute angle and much less deeply divided than in the *Sphenopteris artemesifolia* (Brong.) of the Lower Carboniferous rocks of Northumberland, to which it seems most nearly allied, and which is the type of Schimper's exclusively Palæozoic *Eremopteris*.

Common in hard olive Upper Devonian flags of Iguana Creek.

EXPLANATION OF FIGURES.

Plate XXXVI.—Fig. 3, portion of pinna, natural size. Fig. 4, portion of pinna, showing form of terminal divisions. Fig. 4*a*, portion of ditto magnified to show neuration. Fig. 5, more divided pinna, natural size. Fig. 5*a*, ditto, magnified.

PLATE XXXVI., FIGS. 6 AND 7.

CORDAITES AUSTRALIS (McCOY).

[Genus CORDAITES (UNGER). (Affinities uncertain; leaves like *Dracæna*, but stem structure of *Lomatophloyos*.)

Gen. Char.—Stem cylindrical, having a bark marked with cicatrices of the caducous leaves with a simple woody cylinder with radiating scalariform vessels, but without medullary rays, and large pith with transverse lamellæ. Leaves simple, sessile, very long, flat, parallel-sided, with broad clasping base, easily disarticulated from stem; surface with fine parallel neuration without midrib. Devonian and Carboniferous.]

Description.—Leaves several inches long, thick, flattened, parallel-sided, with unequal longitudinal simple parallel striæ; clasping-base slightly widened and abruptly bent downwards. Leaves at 1 inch from base, about 4 to 5 lines wide; base about 2 to 3 lines wider.

The leaves of this species, although narrow, are much thicker in the substance than in any of the other known species, and the parallel veins are more unequal and less distinct, the larger having fewer and sub-equal small ridges with much more numerous sub-equal fine striæ, thus approaching more to the foliage of *Dammara*, and favoring M. Grand Eury and Prof. Schimper's idea of coniferous affinities.

Common in the Upper Devonian flags of Iguana Creek.

Explanation of Figures.

Plate XXXVI.—Fig. 6, two specimens of leaves, natural size, showing the dilated inflected clasping base, one showing an unusual lateral curvature, and the other showing some remains of the parallel neuration. Fig. 7, another specimen, natural size, also showing the dilated deflected clasping base.

Frederick McCoy.

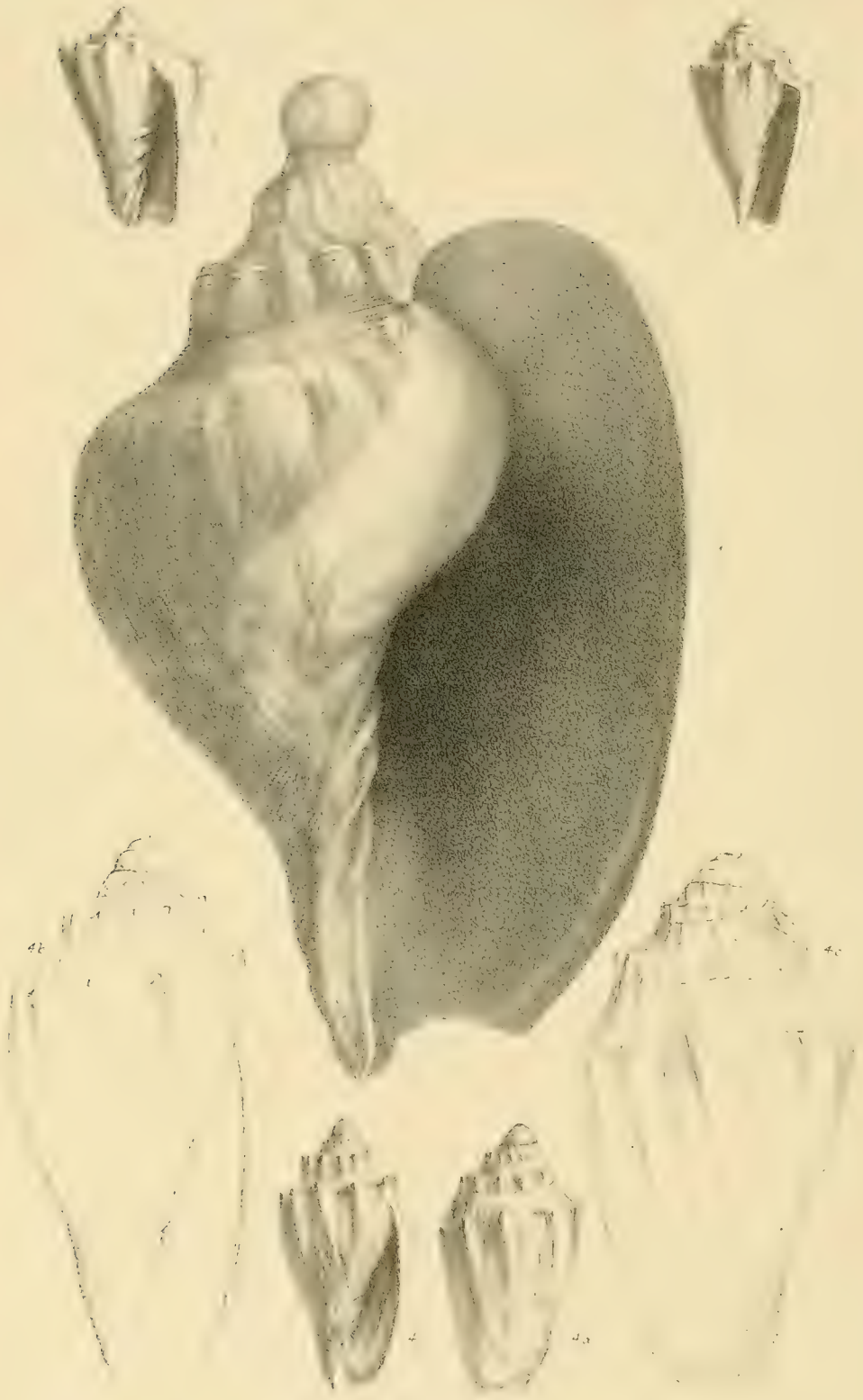


PLATE XXXVII., FIG. 1.

VOLUTA HANNAFORDI (McCOY).

[Genus VOLUTA (LAM.). (Sub-kingd. Mollusca. Class Gasteropoda. Order Pectinibranchiata. Fam. Volutidæ.

Gen. Char.—Shell ovate or fusiform; apex of spire obtuse, mammillated, and oblique; aperture large, with a wide notch in front, not produced into a canal; columella or inner lip with several large oblique prominent plaits, of which the anterior ones are usually largest.]

DESCRIPTION.—(*See* Plate VI., Decade I.)

EXPLANATION OF FIGURE.

Plate XXXVII.—Fig. 1, front view of specimen, natural size.

PLATE XXXVII., FIGS. 2–4*c*.

VOLUTA STROPHODON (McCOY).

DESCRIPTION.—Shape varying from ovate to turbinate or conoidal; spire obtuse, varying greatly in prominence, apical angle from 60° to 110°, usually about 80°, of 6 whorls, the 3 apical ones of which are slightly convex, smooth and without spines, the succeeding whorls each with about 11 small conical spines close to the suture on the spire and crowning a shoulder of varying prominence on the body whorl; space between the spines and suture concave anteriorly, crossed by lines of growth; spines on body whorl continued as variably prominent ribs a variable distance towards the anterior end (usually less than half way); body whorl tapering gradually to the anterior end, the side lines being sometimes nearly straight, more usually with a slight concavity near the front, and a slight convexity thence to the shoulder; mouth narrow, outer lip only slightly thickened in very old specimens; inner lip with 4 very large thick plaits, the posterior larger and less oblique than the anterior; surface marked with lines of growth only (no spiral striæ at anterior end). Average length, $1\frac{1}{2}$ inches (very old example, 2 inches 3 lines); proportional width thereto, $\frac{50}{100}$ to $\frac{65}{100}$; length of body whorl, $\frac{80}{100}$ to $\frac{85}{100}$; length of penultimate whorl, $\frac{10}{100}$ to $\frac{9}{100}$; width of penultimate whorl, $\frac{36}{100}$.

This Volute seems to represent the *Volutilites spinosus* and *V. depauperatus* of the European Upper Eocene strata in size, shape, and in number and form of spines and ribs; but, as in the Victorian

Voluta anti-cingulata and *V. anti-scalaris* (McCoy), which so singularly represent the species of English *Volutilites* indicated by the names I have used for them, it has the blunt mammillated spire of *Voluta* instead of the sharp-pointed regular apex of *Volutilites* found in them. It likewise differs in completely wanting the spiral striæ at the base, and differs from all the allied forms in the character indicated by the specific name, the reversal of the position of the larger and smaller teeth or plaits on the pillar lip, the posterior of which is always the largest instead of the anterior, as in most *Volutes.*

Abundant in the blue Oligocene Tertiary clays of Fyansford (A^d 28) ; also in those of Muddy Creek, near Grange River ; also in those of Moolap (A^d 14) ; occasionally found usually of smaller size in the similar clays and limestone between Mount Eliza and Mount Martha.

Explanation of Figures.

Plate XXXVII.—Fig. 2, remarkably short-spired, conoidal variety, natural size. Fig. 3, average specimen, natural size. Fig. 4, long-spired variety, front view, natural size. Fig. 4*a*, back view of same specimen, showing absence of anterior spiral striæ. Figs. 4*b* and 4*c*, magnified outlines of same views of same specimens.

Frederick McCoy.

A Bartholomew del. et lith *Prof. M^c Coy, direx^t* *De Gruchy & Leigh imp*

PLATE XXXVIII., FIGS. 1–1*d*.

SPONDYLUS GADEROPOIDES (McCOY).

[Genus SPONDYLUS (LIN.). (Sub-kingd. Mollusca. Class Lamellibranchiata. Order Pleuroconcha. Fam. Spondylidæ.)

Gen. Char.—Shell irregular, inequivalve, inequilateral; hinge-line short, straight, forming quadrate ears on each side of the beaks; a flat triangular cardinal area divided longitudinally by a median cartilage groove which separates the beak of the large attached valve from the hinge-line; 2 large cardinal teeth in each valve with pits for opposite teeth, and a triangular central cartilage pit connected with groove of cardinal area; ligament simple, external; adductor impressions large, rounded a little on the posterior side of middle; pallial scar, strong, entire; surface rough spiny.

Mesozoic to recent warm seas in deep water attached to corals or rocks.]

DESCRIPTION.—Obliquely ovato-trigonal, gibbous, surface radiated with very irregular close small ridges of very unequal sizes, often in groups of five with middle one largest, occasionally alternate, roughened, with close spinose transverse scales, usually one to five very small between each pair of larger striæ, from ½ to 1 line in width; from 4 to 10 thick ridges set with moderately close variable long arched spines, depressed near base, often compressed beyond, generally fewer on the upper than on the lower valve, but sometimes the lower valve with no spinose ridges in the middle portion, but two or three on each side; the large valve often with prominent concentric scale-like laminæ near the beak and on the sides; average length of large valve from beak to front margin, 5 inches; proportional length from hinge-line (and length of smaller valve), $\frac{77}{100}$; greatest width, $\frac{75}{100}$; depth of larger valve, $\frac{27}{100}$; depth of small valve very variable.

This fine species of *Spondylus* varies greatly in the convexity of the upper valve, and in the number of the thick spinose ridges on each valve; these are from 1 to 3 lines in width, and set with large depressed spines more closely placed towards the margin. It is quite unlike any shell living in the Victorian waters, and differs from the recent and Tertiary *S. gaderopus* in the much fewer, thicker, and stronger spinose ridges, and the much more numerous unequal and more closely spinulose intervening striæ. At first glance it approaches more nearly to the living *Spondylus Sinensis* and *S. imperialis*, but differs in its much more numerous intermediate striæ, and their much more numerous regular close smaller spinulose scales. It approaches slightly nearer to the radiation of the recent *S. Ducalis*, from which it differs in all other respects.

The *S. bifrons* of Münster from the Osnabrück beds is the nearest analogue amongst fossil species, but ours is much larger,

with fewer spinose ridges on the attached valve, and having them quite as numerous on the upper valve as on the attached one, or even more so ; the ridges with large spines are also much more prominent in the Victorian species.

Occurs in great abundance in Miocene Tertiary sandy strata of Bird Rock Bluff (A^d 23) near Geelong. More rare in the cream-colored Miocene limestone of Boggy Creek, six miles from Sale, Gippsland.

EXPLANATION OF FIGURES.

Plate XXXVIII.—Fig. 1, right or attached valve, natural size, inner view, showing muscular impressions and pallial scar, large cardinal area with its median groove extending to the internal triangular cartilage pit, flanked on each side by a large cardinal tooth, each of which on its outer side has the deep pit for the teeth of the opposite valve. Fig. 1*a*, external surface of same specimen, natural size, showing the usual concentric lamellar character near the beak and on the sides. This individual shows a rather greater number of the large spinose ridges than usual. Fig. 1*b*, portion of large ridge and adjacent smaller ones from the side near the beak, magnified. Fig. 1*c*, small intermediate ridging near the middle margin, magnified. Fig. 1*d*, side view of same specimen, natural size.

N.B.—All the figures on this plate have been unfortunately reversed in the lithographing.

FREDERICK McCOY.

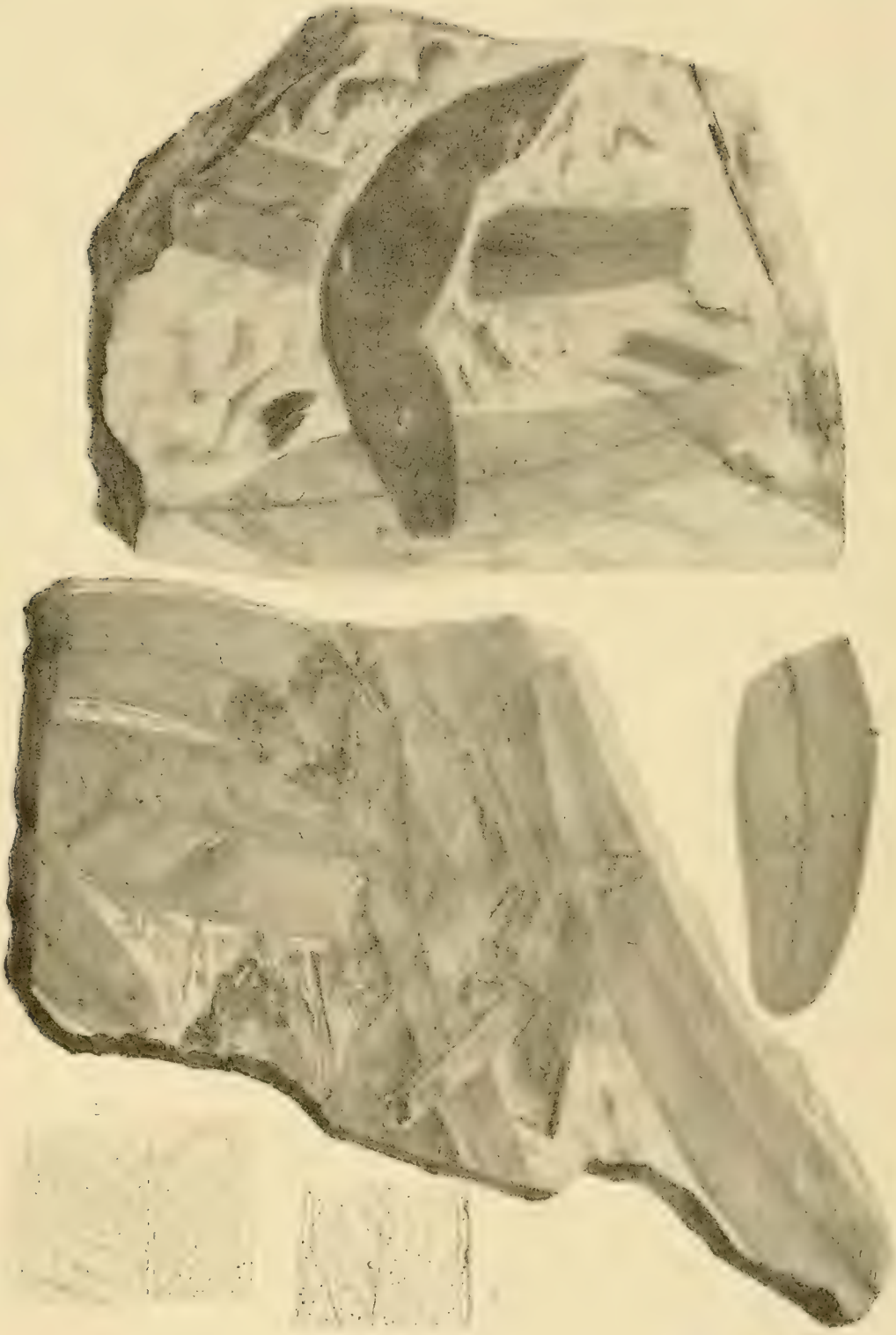


PLATE XXXIX., FIGS. 1–4.

EUCALYPTUS PLUTI (McCOY).

[Genus EUCALYPTUS (LHÉR.). Class Dicotyledonæ. Sc. Calycifloræ. Order Myrtaceæ.)
Gen. Char.—Leaves in young saplings usually horizontal, opposite, sessile, and cordate at base; in the adult usually vertical, alternate, petiolate, broadly ovate to lanceolate, acuminate and falcate; always rigid, penniveined, midrib conspicuous; primary veins often indistinct in thick leaves; few irregular, oblique, and anastomosing, or numerous parallel, diverging or transverse, but always converging into an intramarginal vein; intermediate reticulate veinlets indistinct, nearly absent when the primary veins are closely parallel. (Other characters omitted as not seen in our fossil.)]

DESCRIPTION.—Leaves usually about 5 or 6 inches long and 10 lines wide, falcate, acuminate, rapidly tapering near the petiolate base; substance thick; veins delicate, numerous, oblique, subparallel, with rather few branches, or anastomosis; intramarginal one moderately close to the edge.

The foliage of this species is almost identical in size and shape with that of the living *Eucalyptus globulus*, but the veins are much more numerous, straighter, or less flexuous, and more nearly parallel in the fossil than in the living analogue. In both, the old leaves are narrow and falcate, while, in the fossil, as in the living type, the young leaves are broader and more ovate, with more loosely branching veins.

With the exception of two or three in the Indian Archipelago, all the multitudinous species of *Eucalyptus* are Australian, and form the preponderating characteristic of the scrub and forest vegetations of the country. The absence of *Eucalyptus* in our Victorian Miocene Tertiary clay beds, and its occurrence, now made unmistakably known, in the more recent Pliocene Tertiary strata, is a fact of the highest geological interest, although in accordance with the general law of the near resemblance of Pliocene and Plistocene Tertiary fossils to the prevailing type of structure now living in the same countries, and therefore to be expected.

As this species is at present only known in the beds associated with the gold leads or Tertiary gold drift deposits, I have dedicated

it to *Plutus*, the god of riches, as a reminder of the association of this form with our rich gold leads.

Extremely abundant in the Pliocene Tertiary purplish argillaceous strata of the gold leads at Daylesford.

Explanation of Figures.

Plate XXXIX.—Fig. 1, various average leaves, one showing the petiolate base, and one abnormally bent, natural size. Fig. 2, slab showing the long narrow adult form and the younger broader leaves. Fig. 3, short broad sapling form of leaf. Fig. 2*a*, magnified, venation and oil glands of middle of average adult leaf on right hand edge of fig. 2. Fig. 4, magnified venation of corresponding portion of leaf of the living *Eucalyptus globulus*.

Frederick McCoy.

PL. XL

PLATE XL., FIGS. 1–3.

CINNAMOMUM POLYMORPHOIDES (McCOY.)

[Genus CINNAMOMUM (BURM.). (Class Exogenæ. Sub-class Monochlamydeæ. Order Lauraceæ.)

Gen. Char.—Leaves coriaceous, entire, tri-nerved. (Other characters omitted as not observed in our fossils.)

A living Indian and Tertiary (from beginning of Miocene) genus of Lauraceous trees and shrubs.]

DESCRIPTION.—Leaf petiolate, ovato-elliptical, greatest width about the middle apical half tapering more gradually than the basal half; apex submucronate; midrib strong, two lateral ribs slightly more slender than the midrib, from which they arise above the base, running nearly parallel with the margin to about ⅓rd of the length from the apex, when they unite with the secondary nerves; outer side of each lateral rib with branching veins arising at a little less than a right angle; usual length of leaf, about 4 inches; width, 1½ inches. (Var. *major* nearly double those dimensions.)

The types of foliage agreeing with our fossil are very common in the tropical and sub-tropical Asiatic localities at the present day, but are of a different facies from the living or Pliocene Tertiary Australian forms.

This is a much longer and thicker, or more coriaceous leaf than the *C. polymorphum* (Al. Braun) so abundant in the Miocene plant beds in every part of the world, and the outline of the lower half is more widely rounded or less rapidly tapering to the base. It agrees, however, with that species in the form of the distal half of the leaf, and in the origin of the lateral ribs and their losing themselves in the secondary veins instead of reaching the apex nearly, as in *C. Rossmässleri* (Heer). I have carefully compared our species with specimens of the true *C. polymorphum* (Al. Braun) from the Upper Miocene Braunkohle or Blätterkohle of Katt near Bonn, and from the Molasse or Braunkohle sandstone of Quegstein in the Siebengebirge as to the less tapering base and similar venation of our species. I have not found the fruit or flowers which have been frequently found with the European analogue.

Abundant in the red and yellow ironstone strata of Miocene Tertiary age 2 miles west of Maddingly (A^d 2), and in similar beds at $\frac{1}{2}$ mile N.W. of junction of the Werribee and Lyall's Creek.

EXPLANATION OF FIGURES.

Plate XL.—Fig. 1, type specimen from near Maddingly, natural size. Fig. 1*a*, ditto in outline to show the neuration. Fig. 2, portion of much larger leaf (var. *major*) from near junction of Werribee and Lyall's Creek, natural size. Fig. 3, base of another specimen, showing how high above the base the true lateral ribs arise, natural size.

PLATE XL., FIG. 4.

LAURUS WERRIBEENSIS (McCOY).

[Genus LAURUS (LIN.). (Class Exogenæ. Sub-class Monochlomydeæ. Ord. Lauraceæ.)
Gen. Char.—Leaves coriaceous, thick, entire edged, pinnatinerved, or imperfectly trinerved. (Other parts omitted as not represented by our fossils.)]

DESCRIPTION.—Leaf ovate, lanceolate, petiolate, about 4 inches long and $1\frac{1}{2}$ inches in greatest width a little below middle of length. Midrib strong, basal pair of ribs slightly stronger than the succeeding secondary ones and longer, arising from midrib above the base at about 30° and gently arching upwards and outwards to the margin, subparallel with the edge so as to imperfectly represent the lateral ribs of trinerved leaves; secondary veins successively less oblique to midrib, opposite, arching gently upwards and outwards to the margin. From lateral to 1st secondary vein 1 inch, 2nd to 3rd and 3rd to 4th each 10 lines, 4th to 5th 8 lines. Nervules very fine, numerous, forming a small oblong reticulation.

I adopt Schimper's suggestion of placing temporarily in *Laurus* such lauraceous leaves as have only an imperfect development of the trinerve neuration. The present species is scarcely distinguishable from one I have from the Miocene beds of Altsattel in Bohemia, except for its more regularly opposite secondary veins.

Rare in the Miocene Tertiary ferruginous beds at $\frac{1}{4}$ mile N.W. of junction of the Werribee and Lyall's Creek.

EXPLANATION OF FIGURE.

Plate XL.—Fig. 4, leaf, imperfect at each end, natural size.

FREDERICK McCOY.

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CONTENTS OF DECADES.

N.B.—The originals of all the Figures are in the National Museum, Melbourne.

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